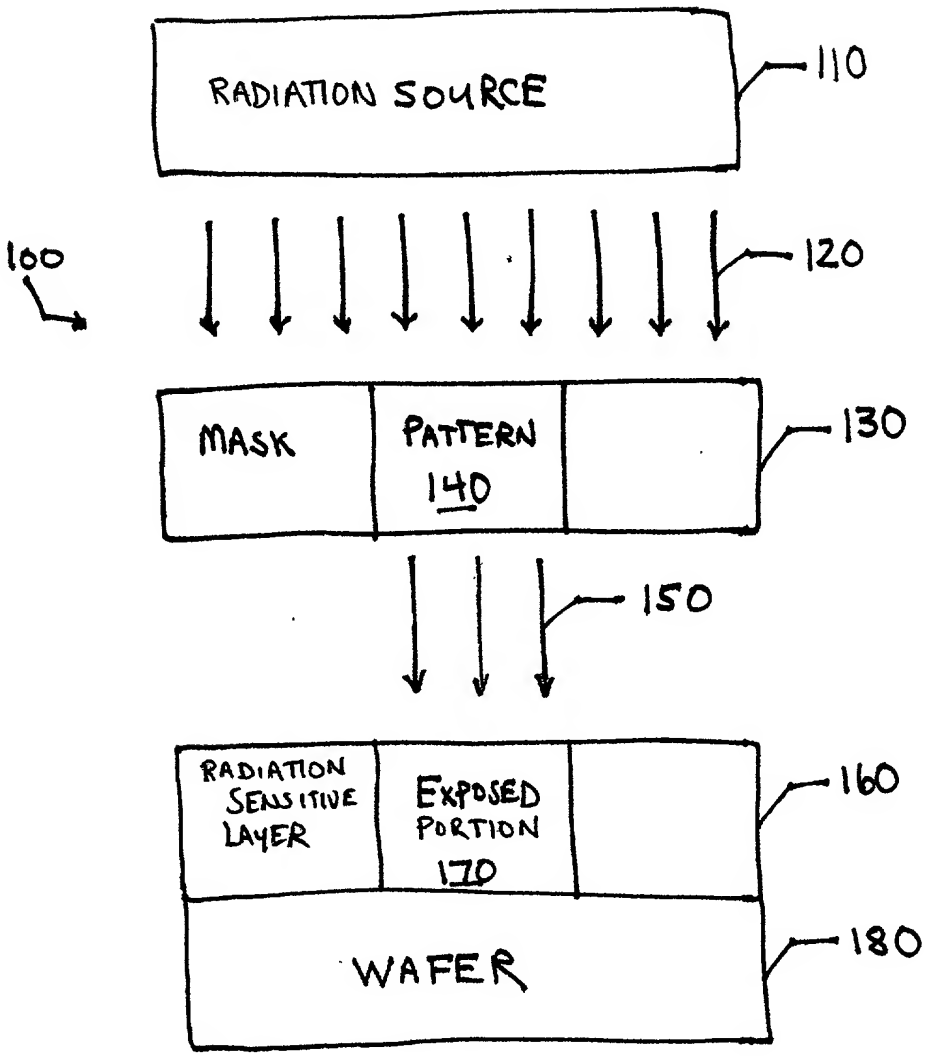
RADIATION SOURCE
110
100
120
MASK
PATTERN
140
130
150
RADIATION SENSITIVE LAYER
EXPOSED PORTION
170
160
WAFER
180

Figure 1

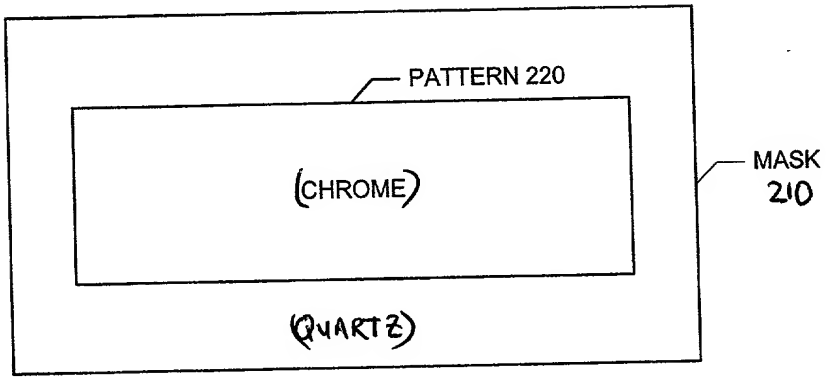

FIGURE 2

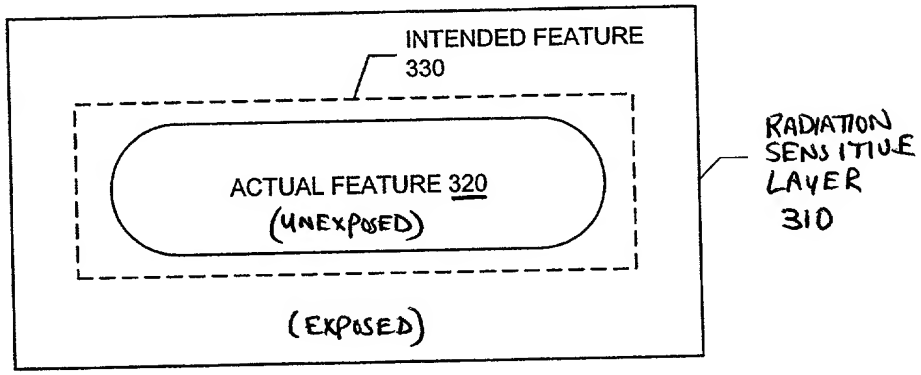

FIGURE 3

Patent Application Publication

Express Mail Label No. EV 040 042 705

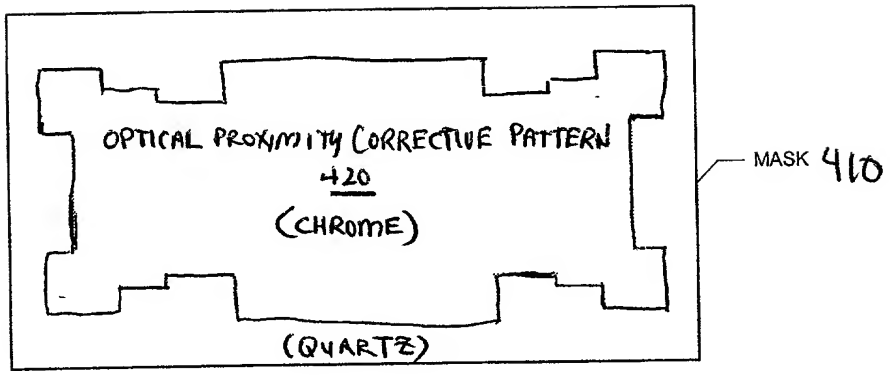

FIGURE 4

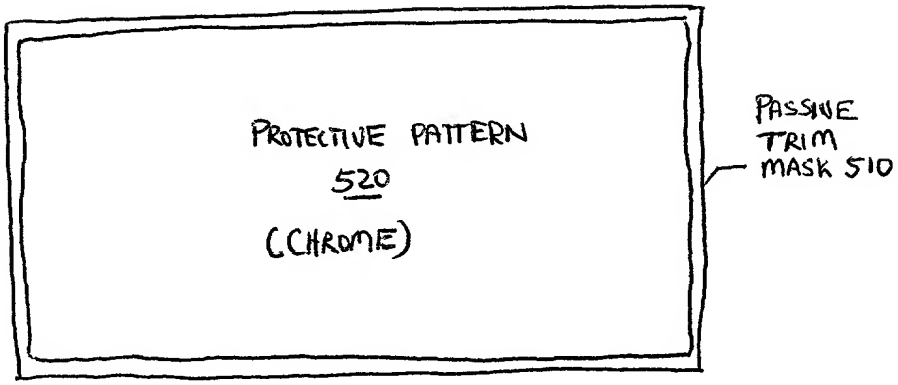

FIGURE 5

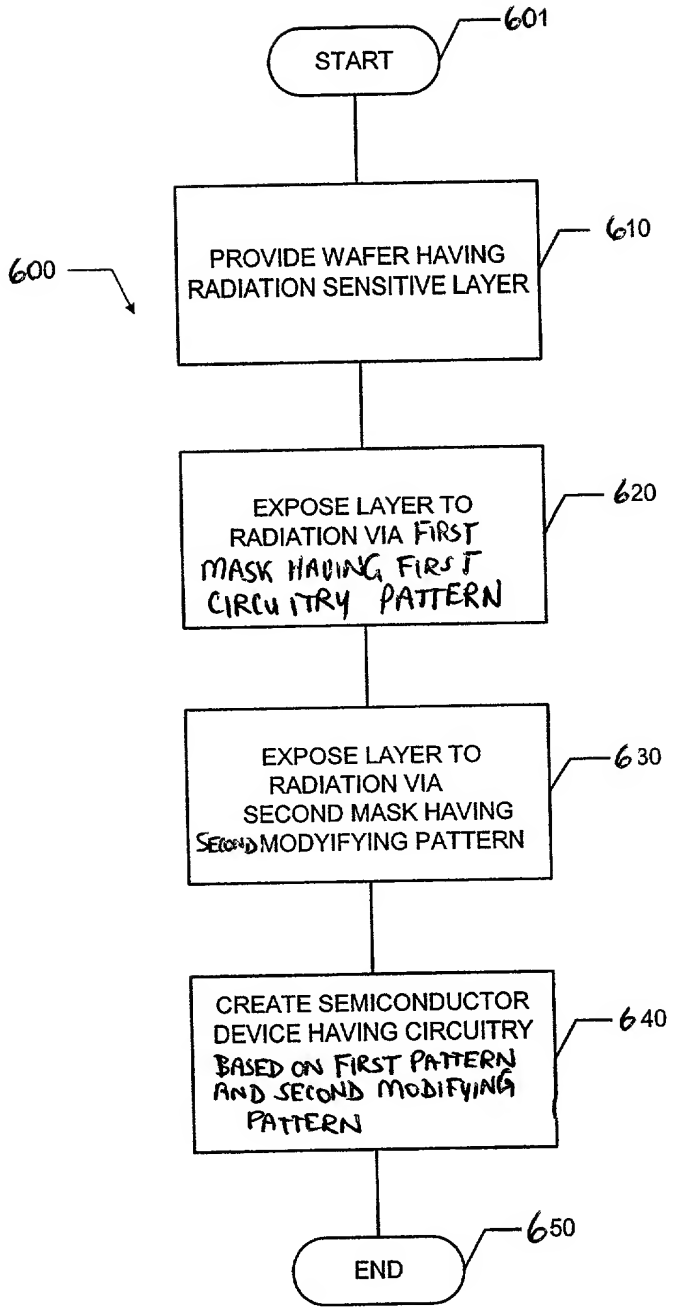
601
START
600
610
PROVIDE WAFER HAVING RADIATION SENSITIVE LAYER
620
EXPOSE LAYER TO RADIATION VIA FIRST MASK HAVING FIRST CIRCUITRY PATTERN
630
EXPOSE LAYER TO RADIATION VIA SECOND MASK HAVING SECOND MODYIFYING PATTERN
640
CREATE SEMICONDUCTOR DEVICE HAVING CIRCUITRY BASED ON FIRST PATTERN AND SECOND MODIFYING PATTERN
650
END

FIGURE 6

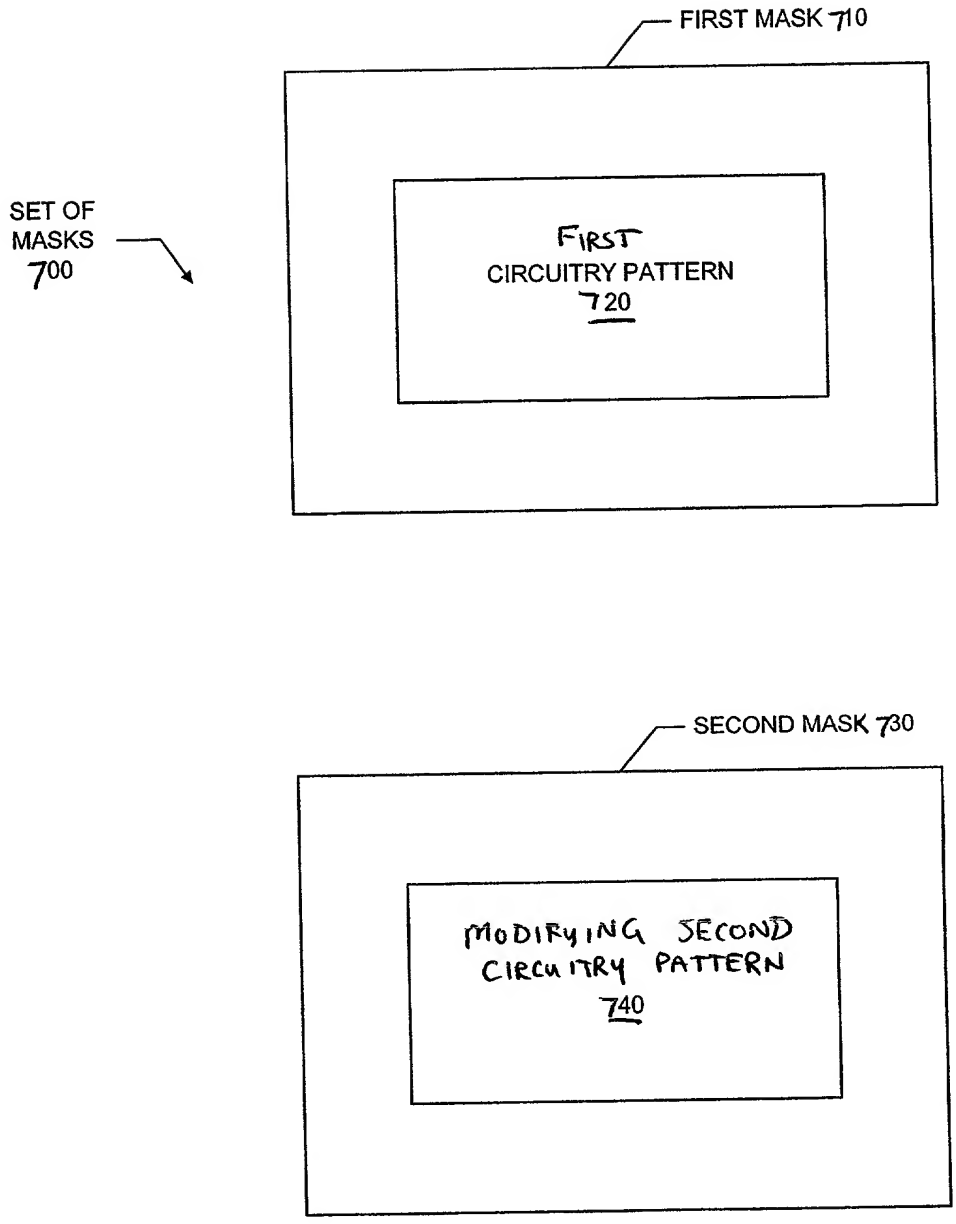
SET OF MASKS 700
FIRST MASK 710
FIRST CIRCUITRY PATTERN 720
SECOND MASK 730
MODIFYING SECOND CIRCUITRY PATTERN 740

FIGURE 7

20170725-2V2040005

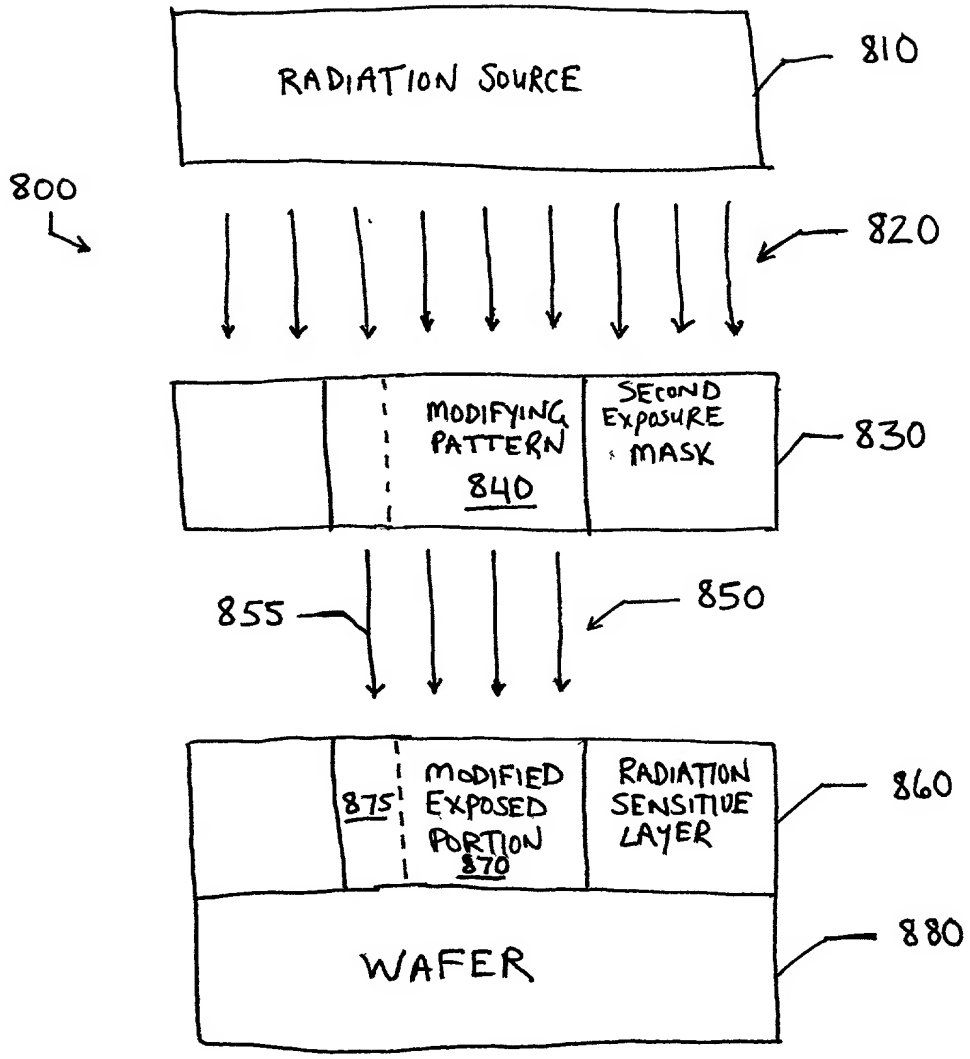

FIGURE 8

20050164102

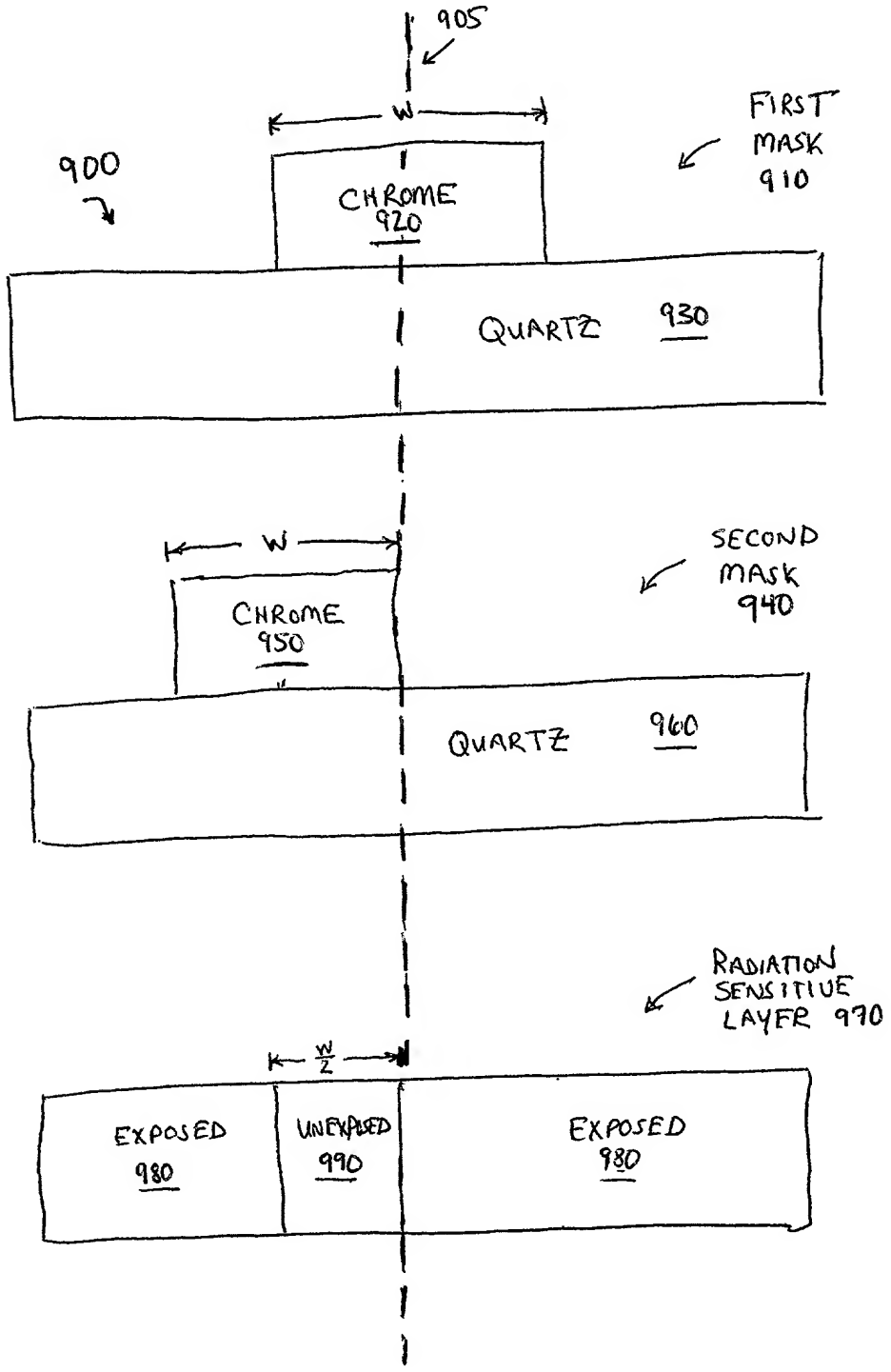

FIGURE 9

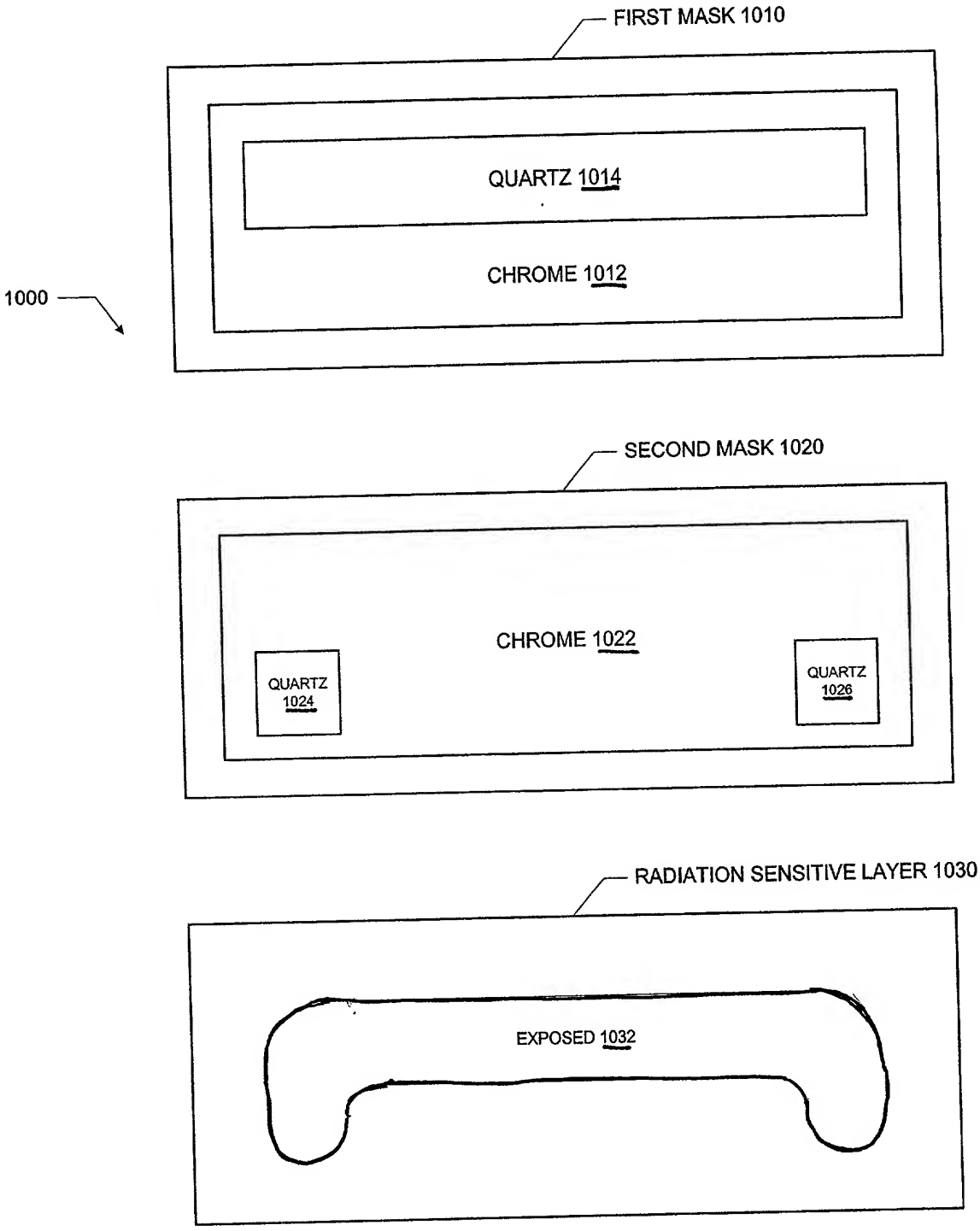
FIRST MASK 1010
QUARTZ 1014
CHROME 1012
1000
SECOND MASK 1020
CHROME 1022
QUARTZ 1024
QUARTZ 1026
RADIATION SENSITIVE LAYER 1030
EXPOSED 1032

FIGURE 10

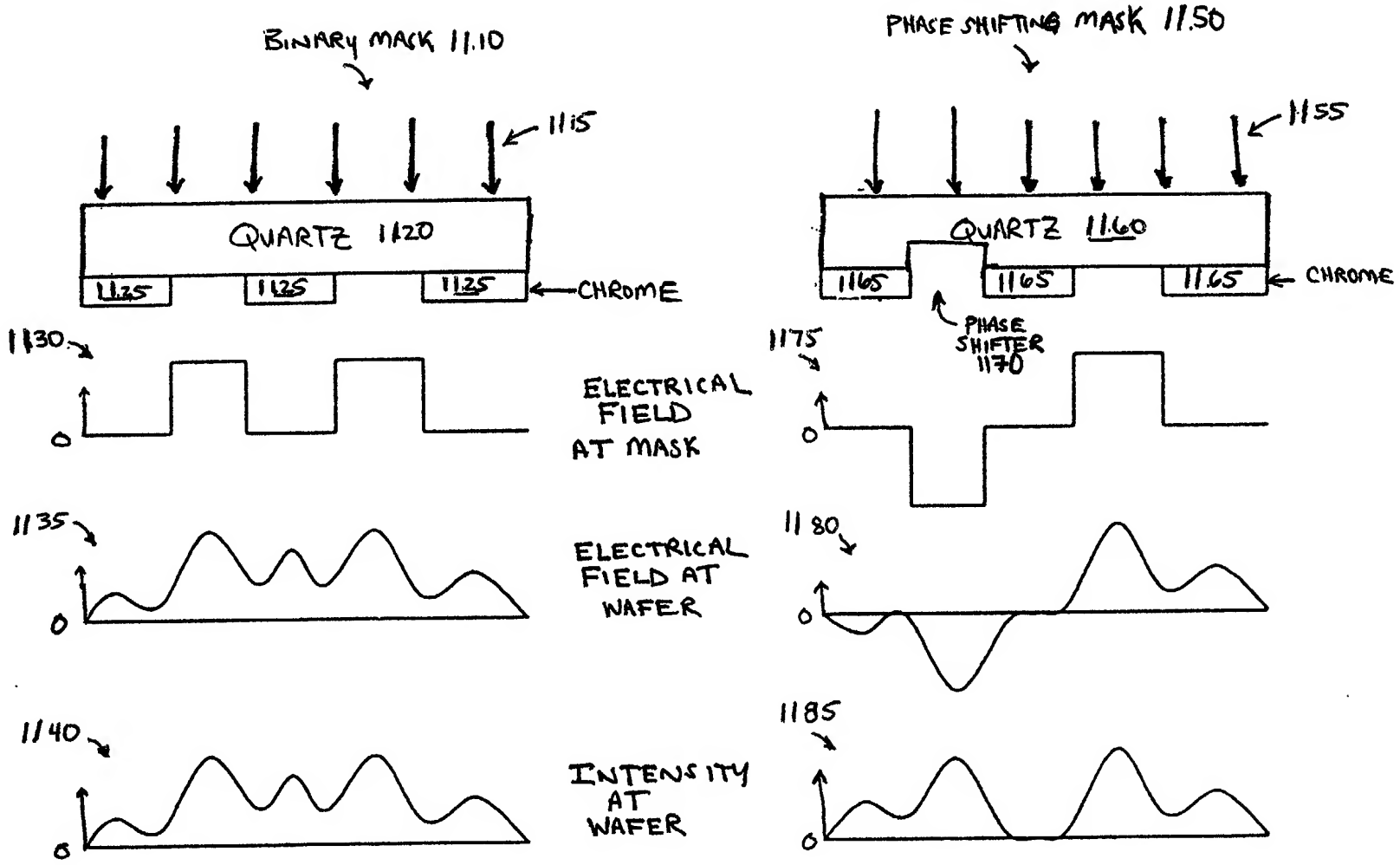
BINARY MASK 1110
1115
QUARTZ 1120
1125
1125
1125
CHROME
1130
0
ELECTRICAL FIELD AT MASK
1135
0
ELECTRICAL FIELD AT WAFER
1140
0
INTENSITY AT WAFER
PHASE SHIFTING MASK 1150
1155
QUARTZ 1160
1165
1165
1165
CHROME
PHASE SHIFTER 1170
1175
0
1180
0
1185
0

FIGURE 11

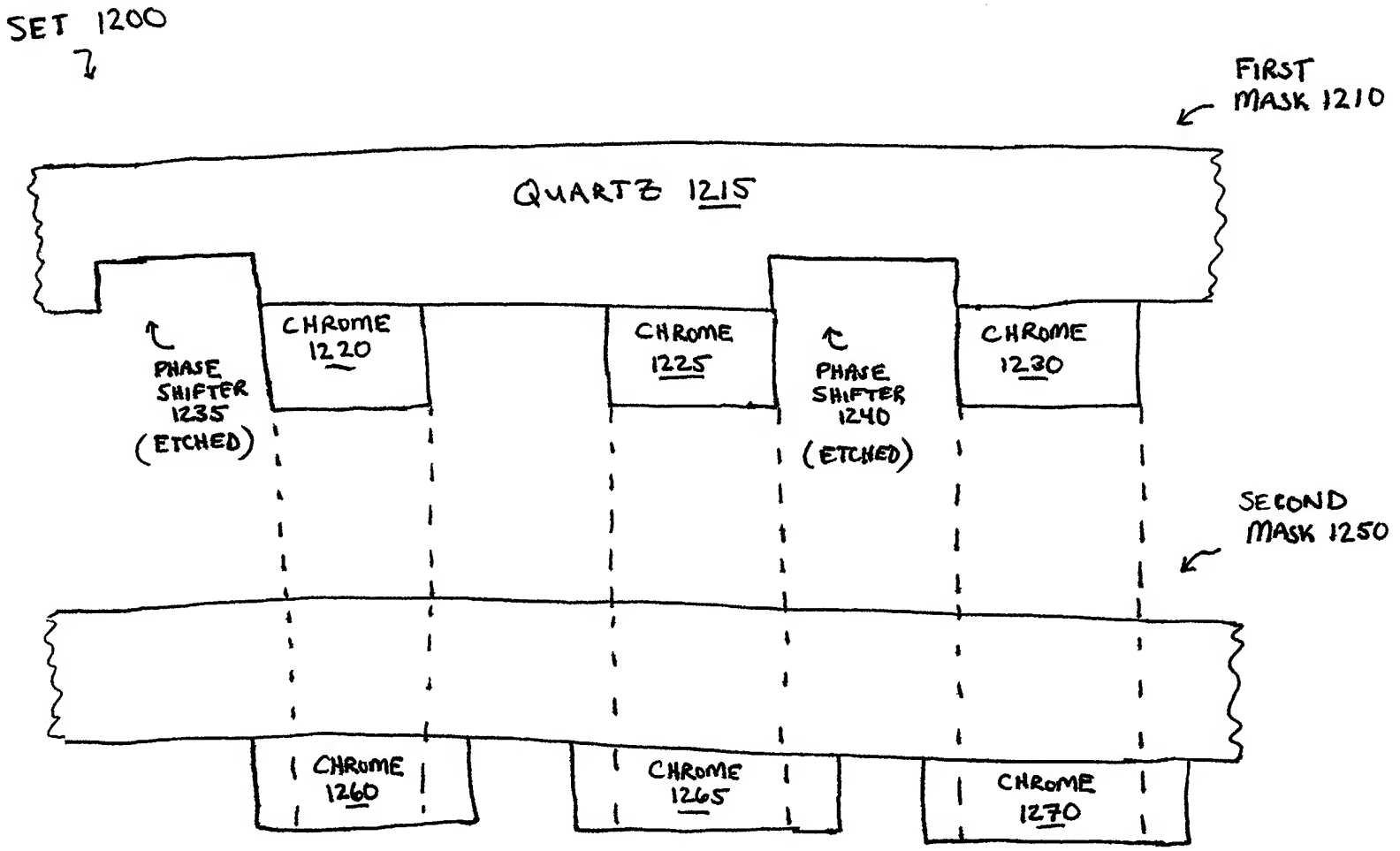
SET 1200
FIRST MASK 1210
QUARTZ 1215
CHROME 1220
CHROME 1225
CHROME 1230
PHASE SHIFTER 1235 (ETCHED)
PHASE SHIFTER 1240 (ETCHED)
SECOND MASK 1250
CHROME 1260
CHROME 1265
CHROME 1270

FIGURE 12

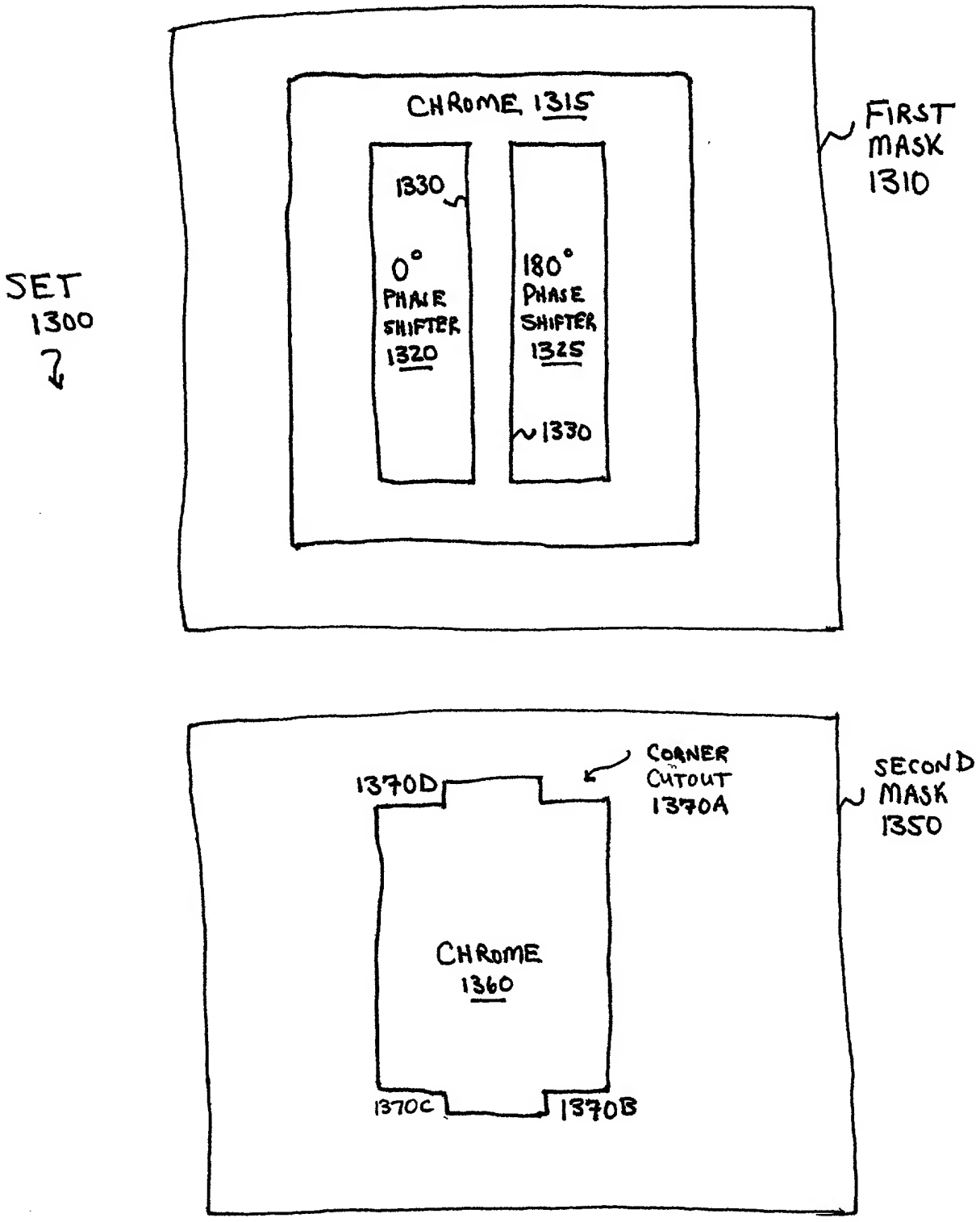
SET
1300
CHROME 1315
1330
0°
PHASE
SHIFTER
1320
180°
PHASE
SHIFTER
1325
1330
FIRST
MASK
1310
CORNER
CUTOUT
1370A
1370D
SECOND
MASK
1350
CHROME
1360
1370C
1370B

FIGURE 13

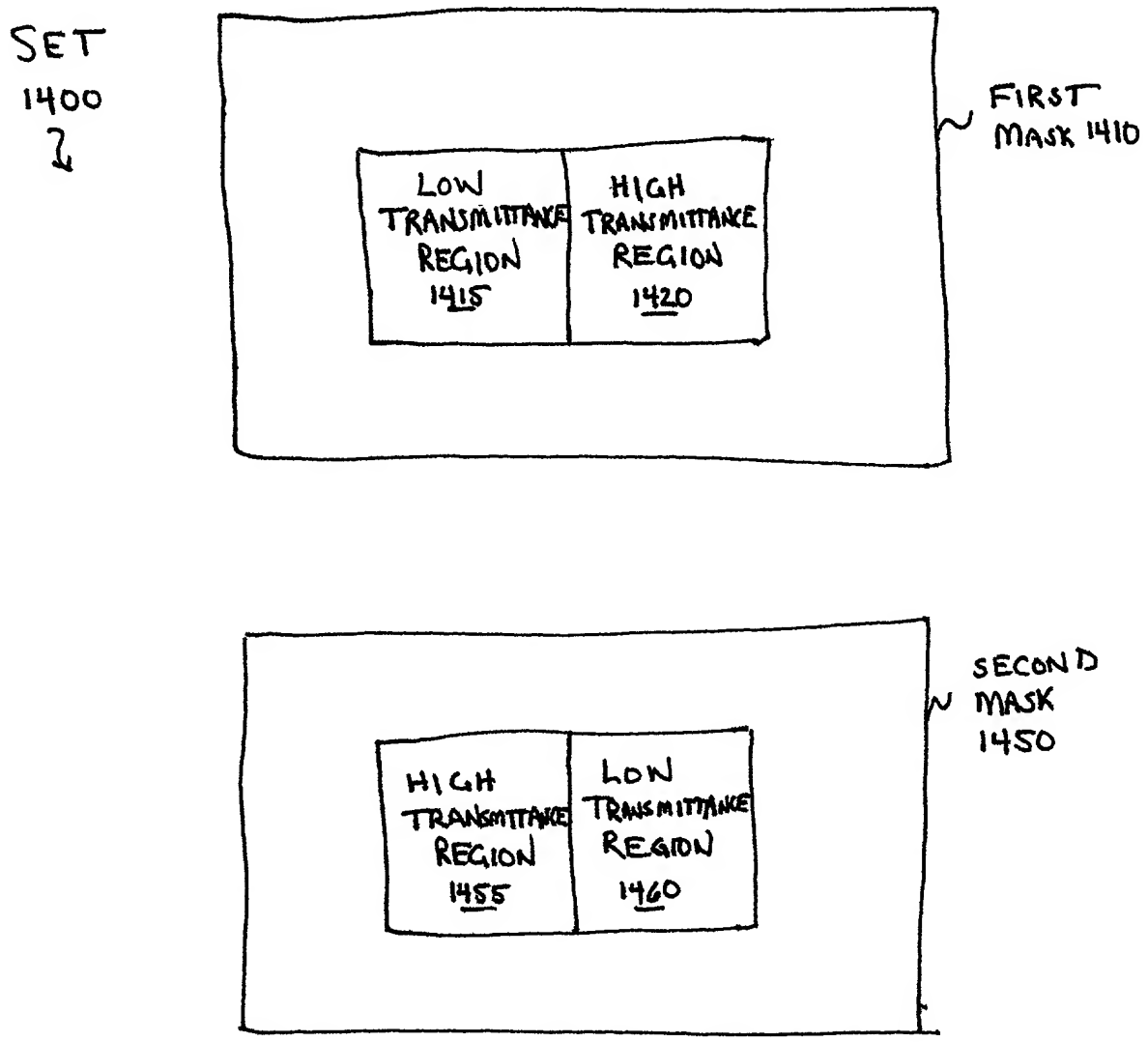
SET
1400
FIRST
MASK 1410
LOW
TRANSMITTANCE
REGION
1415
HIGH
TRANSMITTANCE
REGION
1420
SECOND
MASK
1450
HIGH
TRANSMITTANCE
REGION
1455
LOW
TRANSMITTANCE
REGION
1460

FIGURE 14

20040224.0405

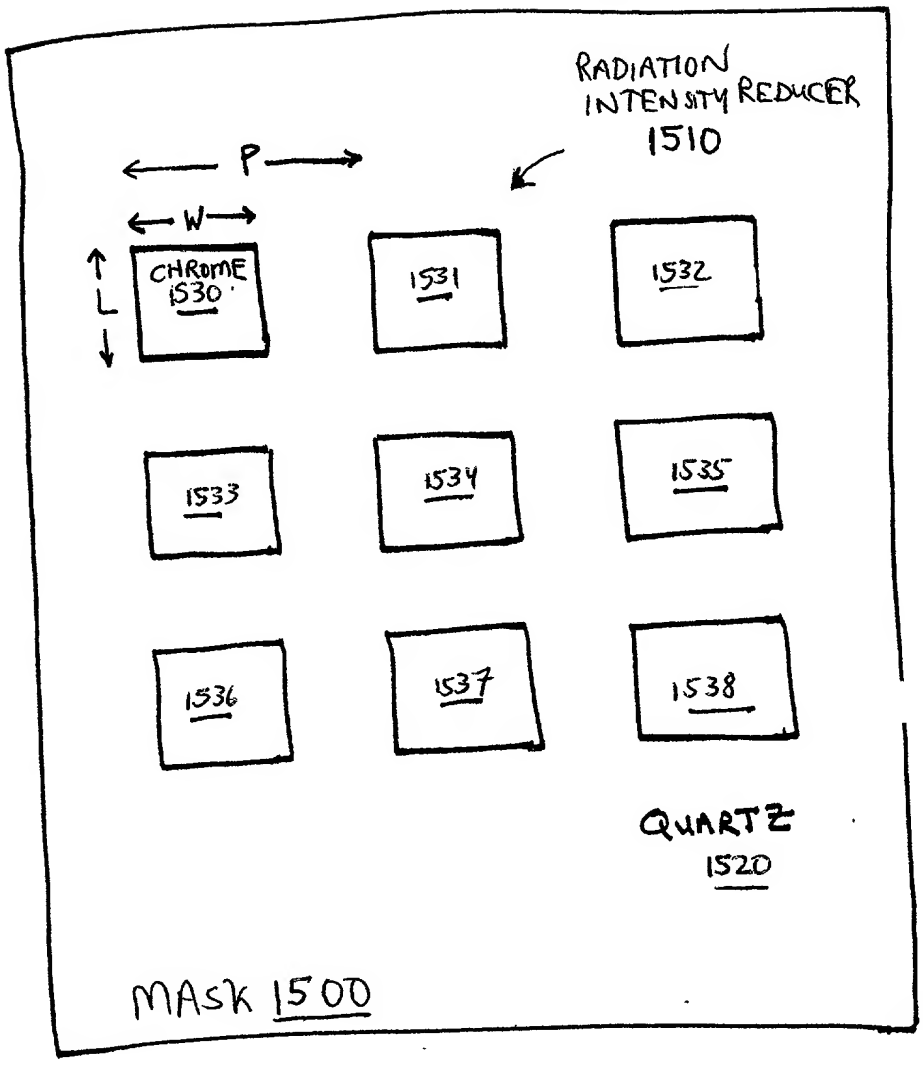

FIGURE 15